Perceived Importance and Barriers to ICT Integration into Sport Management

Darko Dukić [1], Goran Kozina [2], Bojan Bodražić [3]

[1] *Josip Juraj Strossmayer University of Osijek, Department of Physics, Trg Ljudevita Gaja 6, Osijek, Croatia*
[2] *University North, University Centre Varaždin, 104. brigade 3, Varaždin, Croatia*
[3] *Osijek Women's Football Club, Gacka 1c, Osijek, Croatia*

Abstract – The aim of the paper is to explore the perceived importance and barriers to ICT integration in the management of sport organisations, as well as the extent of its use. The research was conducted on a sample of Croatian sport managers. The results indicate that they find ICT essential for efficient sport management practices. The study also showed that managers believe that ICT is used sufficiently in the management of their organisations, which should be taken with caution. The results partially support the hypothesis that there are serious barriers to the integration of ICT into sport management. Of all the barriers analysed, only the lack of funds for equipment purchases and software acquisition was identified as a significant obstacle. The findings of this study fill a gap in the existing literature and contribute to a better understanding of the process of ICT adoption and implementation in sport management.

Keywords – sport managers, perceived importance of ICT, extent of ICT use, barriers to ICT integration, sport management.

1. Introduction

Rapid technological progress is reflected in the constant increase in the capabilities of various devices and the improvement of ICT services. Availability and widespread use have made ICT an integral part of modern life. Today, organisations of all kinds use ICT to achieve their vision, mission, goals, and strategies. In this context, it can safely be said that in the contemporary world there is no area in which ICT is not applied, and sport management is no exception.

Computers, smartphones, tablets, and other electronic equipment have significantly changed management practices. This was to be expected, given its main features. Hammad and Hallinger [1] describe management as processes led by persons holding formal administrative roles through which they plan, organise, and control organisational structures, policies, and operations. Management can also simply be defined as the process of planning, organising, directing, and controlling an organisation for the purpose of achieving goals [2]. It follows from the above that managers, regardless of the type and size of the organisation, perform several important functions. Although there is no consensus on this issue, planning, organising, staffing, leading, and controlling can be considered as the main management functions [3], [4], [5]. Managers at different levels do not have the same tasks and responsibilities. However, regardless of their positions and duties, all managers, from first-line supervisors to chief executive officers, have to successfully perform their functions in order for the organisation to achieve the set goals. They are also responsible for the integration of ICT into business processes, which poses an additional challenge for them.

Nowadays, ICT plays a vital role in sports. According to Schmidt [6], sport and technology have a dynamic relationship. More specifically, sport is a proving ground for new technologies, and they are the main source of disruption in sport. The

implementation of technological innovations has revolutionised the way sports are played by athletes, viewed by consumers, and monetised and regulated by management. In this regard, Schmidt points out that new technologies improve athlete performance, enhance the experience for fans and spectators, enable new classes of athletes in existing competitions, such as machines, computers, and robots, improve sport management and governance, and drive the development of new sports. ICT has a wide range of applications in sport, from educational software and games to simulators and e-learning [7]. As sport-related areas in which ICT is intensively used, Shen et al. [8] mentioned the government affair management (e.g. management system of equipment acquisition approval and administration of sport websites), school physical education (e.g. creation of multimedia content and physical education in remote), competitive sport (e.g. following major sporting events, analysing training, and detecting athletes' metabolism for adaptation), mass sports (e.g. virtual reality fitness), the sport industry (e.g. sportswear technology, advertising through various channels, and collecting and processing marketing data), and sport and leisure (e.g. online lottery). Technological advances have led to an explosion of data and information from the domain of sport. The need to discover knowledge from large data sets has spurred the development of sport analytics. This field of research and practice, characterised by a complex of directions, methods, and tools, connects several areas such as computing, mathematics, statistics, and sport science [9], [10]. Sport analytics is becoming increasingly important and widely used in various sport contexts and settings. ICT progress has led to the emergence of another new discipline, known as sport informatics. Sport informatics covers all activities related to computer and sport science, ranging from simple tools for handling data and controlling sensors to modelling and simulation of complex phenomena [11].

Technological innovations have dramatically changed the sport. In this context, Ratten [12] points out that they are crucial for the ability of a sport organisation to gain a competitive advantage. On the other hand, as Ratten states, technological changes, along with other factors, have made sport management much more complex and demanding. Indeed, sport management, summarised from the various author's definitions by Retar et al. [13] as a process of resource management and cooperation with stakeholders which enables efficiently realisation of business and sport goals, is facing increasing pressures. A sport organisation that is prepared and responsive to the newly emerging challenges will better anticipate changes and adapt to them [14]. Integrating ICT into sport management is

not an easy task, but it is necessary because modern digital tools can be of great help to managers. With this in mind, the present study sought to determine the importance of ICT and identify barriers to its integration into sport management.

2. The Role of ICT in Management

As we live in the digital age, both for-profit and non-profit organisations have to keep up with technological developments. Successful managers and entrepreneurs recognise the need to integrate ICT into their products and services. Outdated technology not only slows down business activities but also often incurs high maintenance costs. Therefore, leaders of organisations need to know how to get the most out of the internet, mobile devices, social networks, cloud computing, big data analytics, and other emerging technologies to propel their business forward [15]. ICT is so pervasive that managers at all levels and in all functional areas cannot avoid being involved in its implementation. According to Lucas [16], managers constantly deal with the following decisions related to ICT: applying technology in designing and structuring the organisation, creating partnerships through electronic means, selecting systems to support different kinds of workers, adopting groupware or group decision support systems, determining a web strategy, routing transaction processing systems, use of computers and networks to perform tasks, reporting and control, automation of production processes, and work with a growing number of embedded products.

Managers play a critical role in the introduction and integration of ICT in an organisation. They initiate and direct the development of ICT strategies and policies, identify opportunities and threats, set priorities, and evaluate proposed solutions [17]. Analysing the role and importance of managers in integration of ICT in knowledge-intensive businesses, Devece [18] concluded that they, as the main actors in this process, are required to understand the potential of ICT and information systems management. In addition, Devece found that ICT competencies of managers significantly influence their support and commitment to investing in ICT. Several other studies have also pointed to the connection between managers' ICT experience and competencies and championship of ICT, i.e. the adoption of new technologies in the organisation [19], [20], [21].

Managers have to base their decisions on timely, accurate, and relevant information. In order to provide the necessary data and information, information systems are established in organisations. An information system is a set of interconnected components (hardware, software, data, people, and

procedures) used to collect, process, store, transmit, present, deliver, and exchange information [22], [23]. The information needs of managers at the lower, middle, and top levels vary. This is why different types of information systems are employed in management practices. Lower-level managers make operational decisions that are highly structured (programmed, repetitive, and routine). This level of management is supported by transaction processing systems (TPS), which ensure that day-to-day operations are performed quickly, accurately, and in accordance with procedures [24]. Transaction processing systems are widely used in many different organisations. Some examples include purchase and sale transactions, payroll, cost recording, inventory status, and supplier data [25], [26]. Middle-level managers make tactical decisions that are typically semi-structured. The information needs of middle management are largely supported by management information systems (MIS). They provide managers with information in the form of reports. Examples include reports on sales, working hours of employees, and consumption of raw materials [27]. The decision support system (DSS) can be generally defined as a class of computerised information system whose purpose is to enhance the ability of managers to make decisions [28]. Managers at different organisational levels employ such systems as support in making semi-structured and unstructured decisions [29]. Executive information systems (EIS), also called executive support systems (ESS), are intended for senior managers. They primarily assist them in taking strategic decisions. The purpose of such systems is to analyse trends that are important for long-term planning and determining the direction of the organisation. Accordingly, they are designed to provide managers with timely and relevant information on critical success factors in a user-friendly manner [30]. This is why executive information systems are focused on both internal and external information.

There are numerous benefits of using information systems in organisations. They can be classified into four groups: organisational, managerial, strategic, and technical [31]. Organisational benefits are manifested in more organised processes thus improving the business efficiency, managerial benefits in greater return on investment and increased business performance, strategic benefits in better cooperation within the company and with external partners, and technical benefits in increased flow and accessibility of data and information. According to Boddy et al. [32], it is necessary to distinguish between tangible and intangible benefits of information systems. The tangible benefits of information systems are cost savings, quality improvement, avoiding cost increases, revenue growth, and staying in business. Intangible benefits, unlike tangible ones, are difficult or impossible to quantify. Some of the intangible benefits of using information systems are improved communication, employee morale, customer satisfaction, organisational reputation, customer management, value chain management, flexibility, organisational learning, and differentiation. Many managers were initially very sceptical about the usefulness of information systems. However, over time, they began to realise the potential of information systems to help organisations achieve their goals [33]. In the electronic era, it is generally accepted that organisations cannot be successfully managed without ICT support, and that the use of a well-designed information system is a fundamental prerequisite for efficient and effective management.

3. Research Objectives, Hypotheses, and Methods

Understanding users' behaviour is critical to the adoption of ICT in any organisation. As ICT has become a key tool for managers, it is vital to examine the ways in which it affects their performance. It is also necessary to look at how managers perceive ICT and what the barriers are to the successful ICT implementation in management. Despite their relevance, these issues have not yet received the attention they deserve. In contrast, some other aspects of ICT use are relatively well discussed in the literature. There are several studies that have examined managers' perceptions of the role and importance of ICT for business success and growth. There are also papers that have addressed obstacles to ICT adoption and integration in business organisations. Although closely related to these topics, the subject of the usefulness of ICT for managers and barriers to ICT integration into management practices has only been superficially explored. This is especially true for sport management. Despite the fact that sport has received considerable attention from scholars and practitioners [34] and that significant progress has been made in the development of sport management theory in recent decades, there are no studies examining the role of ICT and factors that hinder ICT use from the sport managers' perspective. A very few papers in the available literature touched on these issues, but only marginally and with the focus placed on other aspects of ICT application [35], [36], [37]. Therefore, their results cannot be compared with those presented here.

Taking into account the above mentioned, the main aim of the present study is to explore the perceived importance and barriers to ICT integration in the management of sport organisations. Moreover, the

study intends to determine the level of ICT use in sport management. The findings are based on the attitudes and perceptions of Croatian sport managers. Given the above, the following research hypotheses have been formulated and tested:

H1 Croatian sport managers agree that ICT is essential for efficient management of sport organisations.

H2 Croatian sport managers agree that ICT plays an important role in performing certain management functions and activities.

H3 Croatian sport managers believe that ICT is sufficiently used in the management of their sport organisations.

H4 Croatian sport managers agree that there are serious barriers to the integration of ICT into sport management.

For the purpose of this research, ICT is defined as any technology used by sport managers to create, process, gather, access, store, present or distribute information in a digital form. Accordingly, in the present study ICT refers to all devices, tools, and applications that can help managers of sport organisations to carry out their jobs more effectively and efficiently. Such a broad approach was necessary because in line with the research focus the survey included sport managers from diverse settings and backgrounds. In that sense, sport managers are defined as those responsible for planning, organising, staffing, leading, and controlling at any organisational level, such as presidents of national sport federations, presidents of sport clubs and members of the boards, presidents and members of the supervisory boards, sporting directors, assistant managers, heads of departments, etc. Thus, the focus was on persons who manage the business of their organisations and lead people towards achieving the set goals.

Both descriptive and inferential statistics were employed to analyse the data. Descriptive statistics included frequencies and percentages, central tendency measures (mean, median, and mode), and measures of dispersion (standard deviation and interquartile range). They were calculated to describe the sample and distribution of responses. A one-sample Wilcoxon signed rank test was used to test the hypothesis that the median response was greater than 3 (neutral). Where the assumption that the data are symmetrically distributed was violated, the results of one-sample Wilcoxon signed rank tests were compared with those of t-tests. Due to space constraints, the results of the one-sample t-test are not presented here. The hypotheses were tested at 0.05 level of significance.

4. Instrument and Sample

This study is part of a broader research effort to examine the implementation of ICT in the management of sport organisations. A self-administered questionnaire was developed for the purpose of the survey. The first part of the questionnaire consisted of socio-demographic questions, followed by sections focused on various aspects of ICT adoption and use in sport management. Participants' responses to items included in this study were measured on a five-point scale (1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree (neutral), 4 = somewhat agree, 5 = strongly agree).

The target population were persons in managerial positions in Croatian sport federations and clubs of Olympic sports. There are 44 national Olympic sport federations, which incorporate more than 4100 clubs with approximately 250 000 athletes [38]. The national federations are members of the Croatian Olympic Committee, the highest non-governmental national body for sport in Croatia. The Croatian Olympic Committee, along with the Croatian Paralympic Committee and the Croatian Deaf Sport Association, is responsible for creating conditions that enable athletes to achieve the best results, while the Croatian Academic Sport Federation and the Croatian School Sport Federation are the governing bodies for sport in the education system of the country. These five umbrella sport organisations are mostly funded from the state budget. Public needs programs at the local and regional level receive financial support from the city, municipal, and county budgets.

The data were collected using an online questionnaire. The questionnaire was completed by 302 participants and their responses were analysed to test the hypotheses. The sample comprised 206 (68.2%) men and 96 (31.8%) women. The mean age of respondents was 43.1 years with a standard deviation of 9.91 years. The median age was 43 years, while the mode was 42 years. The youngest participant was 21 years old and the oldest 69 years old. Of all surveyed managers, 91 (30.1%) had secondary education, 55 (18.2%) had completed undergraduate studies, 122 (40.4%) graduate studies, and 34 (11.3%) postgraduate studies. There were 64 (21.2%) respondents with a degree in sport science and physical education. The other 238 (78.8%) participants were mainly from the fields of engineering, business, and law. Most respondents, 252 (83.4%) of them, reported being senior managers. Their high representation in the sample is due to the fact that in most amateur sport organisations, which predominate in Croatia, and thus in the sample, very few people are engaged in

management and administrative tasks. Therefore, these individuals have a wide range of responsibilities including those of senior management. The sample also involved 19 (6.3%) mid-level and 31 (10.3%) lower-level managers.

5. Study Results

The vast majority of participants, 278 (92.1%) of them, strongly or somewhat agreed that ICT is essential for the efficient management of sport organisations. Only 24 (7.9%) respondents disagreed with this statement or had a neutral attitude towards it. The mean for this item was 4.53 with a standard deviation of 0.74. Both the median and mode were 5, while the interquartile range was 1. The one-sample Wilcoxon signed rank test confirmed that the median response was greater than 3 ($W = 39777$, $p < 0.001$). Since the assumption that the data follow a symmetric distribution was violated, the t-test was also applied, which led to the same conclusions as the one-sample Wilcoxon signed rank test. Therefore, the first hypothesis, proposing that Croatian sport managers agree that ICT is essential for efficient management of sport organisations, is accepted.

In order to test the second hypothesis, the respondents were asked to express their agreement with statements about the necessity of using ICT to efficiently perform certain management functions and activities. Figure 1 shows the distribution of responses regarding these issues. For the purpose of graphical presentation and analysis, participants' responses indicating that they strongly or somewhat agreed were grouped together, and those stating that they strongly or somewhat disagreed or were neutral were also grouped together.

The responses suggest that managers are highly aware of the importance of integrating ICT into sport management. The percentage of sport managers who strongly or somewhat agreed that ICT is necessary for the successful performance of certain management functions and activities ranged from over 75% to more than 92%. Most participants agreed that ICT helps them in carrying out their organising tasks. More than 91% of respondents also find that ICT is essential for efficient planning and communication. There is a slightly lower percentage of sport managers who agreed on the importance of ICT in controlling and staffing. Participants expressed the lowest level of agreement with the statement that ICT is necessary for efficient decision-making. But even in this case only about 25% of respondents disagreed or had a neutral opinion. From this, it can be concluded that there is a small number of Croatian sport managers who are not familiar with the potential of ICT use in the decision-making process. Nevertheless, the results are very encouraging, as the first step in integrating ICT into managerial practices is an awareness of the necessity of using them.

Table 1 contains descriptive statistics of participants' attitudes towards the role that ICT plays in performing management functions and activities. In addition, the table presents the results of one-sample Wilcoxon signed rank tests, which include test statistics, denoted by W, and the corresponding significance level p.
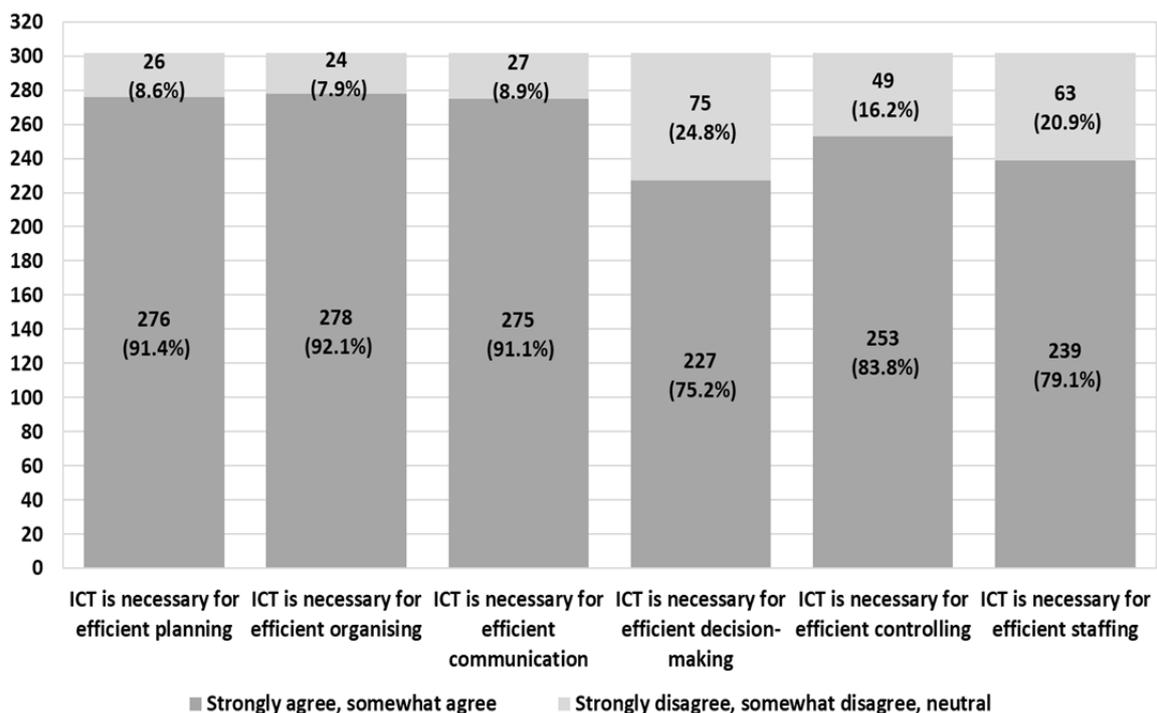

Figure 1. Responses to the items regarding the perceived importance of ICT

Table 1. Descriptive statistics of the perceived importance of ICT and results of one-sample Wilcoxon signed rank tests

Item	Descriptive statistics					One-sample Wilcoxon signed rank test	
	Mean	Median	Mode	Standard deviation	Interquartile range	W	p
ICT is necessary for efficient planning	4.51	5.00	5.00	0.75	1.00	39577.50	0.000*
ICT is necessary for efficient organising	4.51	5.00	5.00	0.74	1.00	40134.00	0.000*
ICT is necessary for efficient communication	4.53	5.00	5.00	0.72	1.00	38609.00	0.000*
ICT is necessary for efficient decision-making	4.12	4.00	5.00	1.00	1.00	28064.00	0.000*
ICT is necessary for efficient controlling	4.30	5.00	5.00	0.87	1.00	34199.50	0.000*
ICT is necessary for efficient staffing	4.24	4.00	5.00	0.89	1.00	30261.50	0.000*

* Statistically significant at $p < 0.05$

The values of the central tendency measures are in line with the above findings. The means ranged from 4.12 to 4.53, while four of the six medians and all modes were 5, indicating a very high level of agreement of Croatian sport managers with each of the survey items. The largest standard deviation was found for the statement that ICT is necessary for efficient decision-making. No standard deviation was greater than 1 and all interquartile ranges were 1, which suggests that respondents have similar views on the importance of ICT. As expected, the one-sample Wilcoxon signed rank test in all cases confirmed that the median response was greater than 3. Since the assumption that the data come from symmetric distributions was not met, the t-test was again applied in the analysis. The results of the t-test also supported the second hypothesis that Croatian sport managers agree that ICT plays an important role in performing certain management functions and activities.

The third hypothesis is based on the assumption that, despite obstacles and difficulties, ICT is sufficiently used in the management of sport organisations. A total of 148 (49%) respondents strongly or somewhat agreed with this statement. On the other hand, 154 (51%) participants either disagreed that ICT is sufficiently used in the management of their sport organisations or gave a neutral response. It should be noted that only 19 (6.3%) respondents of those surveyed strongly disagreed with the statement, while most respondents, 79 (26.2%) of them, somewhat agreed. Therefore, the mode of the distribution of responses was 4. The mean of this variable was 3.39 with a standard deviation of 1.21. In this case, the median was 3 and the interquartile range was 2. Both measures of dispersion suggest that here, in contrast to previous statements, Croatian sport managers showed greater variability in their responses. The one-sample Wilcoxon signed rank test was conducted to test the third hypothesis. According to this test, the median response is greater than 3 ($W = 18191.5$, $p < 0.001$). This means that the third hypothesis, which states that Croatian sport managers believe that ICT is sufficiently used in the management of their sport organisations, is accepted.

At the end of the questionnaire, the respondents were asked to answer how much they agree with statements about barriers to the use of ICT in sport management. It was expected that their responses would reveal factors that hinder them from integrating ICT into their managerial practices. However, in line with the finding that ICT is sufficiently used in the management of sport organisations, the surveyed managers were reluctant to agree that there were many serious obstacles to ICT implementation. As can be seen in Figure 2, participants mostly disagreed or were neutral about the statements. There were only two items with which more than half of the sample strongly or somewhat agreed. More precisely, the lack of funds for software acquisition and equipment purchases was indicated by respondents as a possible barrier to the integration of ICT into sport management. But even in these cases, just slightly more than 50% of the surveyed managers expressed such an opinion. About 43% of participants agreed that the lack of technical support is also a barrier. Between 23.2% and 33.1% of the sample agreed with other statements about barriers.

Table 2 lists the descriptive statistics of participants' attitudes towards barriers to ICT integration into sport management and the results of one-sample Wilcoxon signed rank tests.
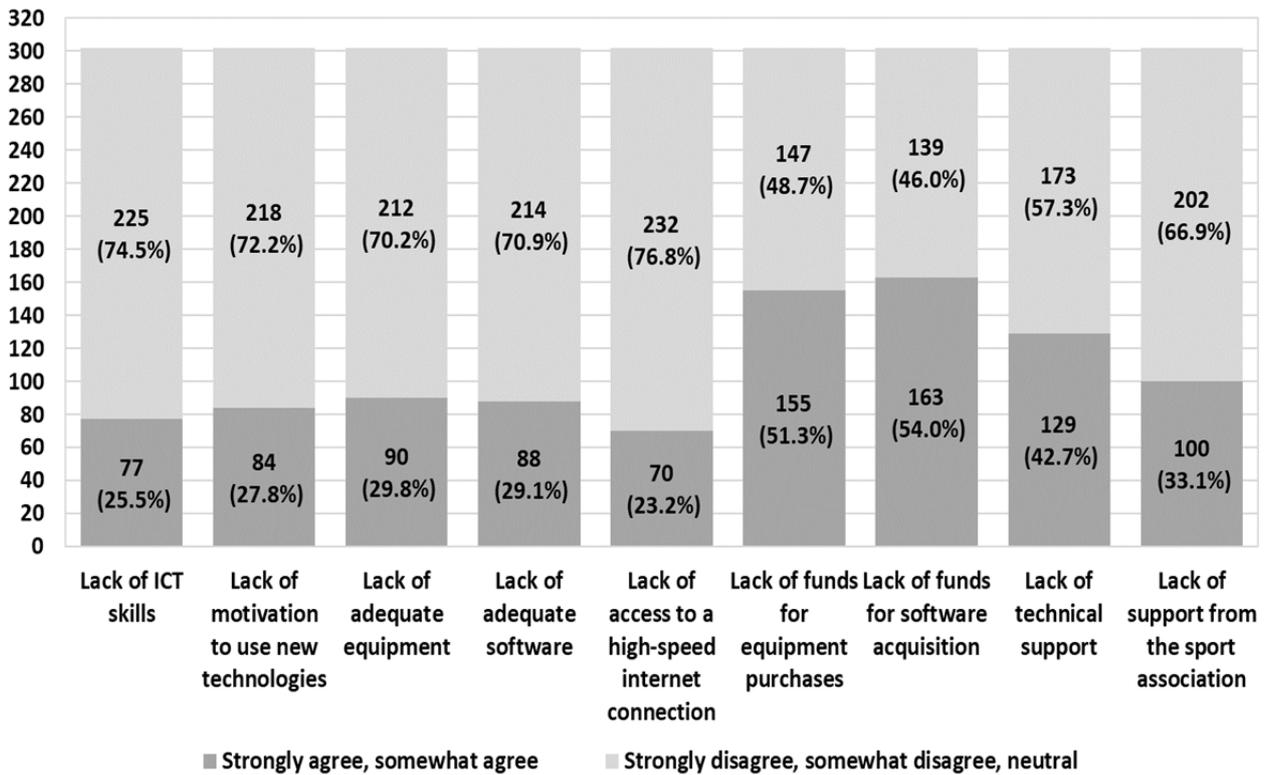
Figure 2. Responses to the items regarding the perceived barriers to ICT integration

There were three items for which the mean was greater than 3. In two of these cases, the median was 4. The mode ranged from 1 to 5. Overall, participants showed great variability in their responses, as indicated by both measures of dispersion. The smallest standard deviation was 1.28, while the interquartile range was either 2 or 3. Based on the results of one-sample Wilcoxon signed rank tests, it can be concluded that Croatian sport managers agreed that the lack of funds for equipment purchases

and software acquisition is a barrier to the implementation of ICT in the management of their organisations. On the other side, the lack of ICT skills, lack of motivation to use new technologies, lack of adequate equipment and software, lack of access to high-speed internet connection, lack of technical support, and lack of support from the sport association are not perceived as significant barriers to ICT integration into sport management. Accordingly, the fourth hypothesis is partially accepted.

Table 2. Descriptive statistics of the perceived barriers to ICT integration and results of one-sample Wilcoxon signed rank tests

Item	Descriptive statistics					One-sample Wilcoxon signed rank test	
	Mean	Median	Mode	Standard deviation	Interquartile range	W	p
Lack of ICT skills	2.50	2.00	1.00	1.28	3.00	7634.00	1.000
Lack of motivation to use new technologies	2.58	3.00	1.00	1.28	3.00	7717.50	1.000
Lack of adequate equipment	2.66	2.00	2.00	1.33	2.00	10650.00	1.000
Lack of adequate software	2.67	3.00	2.00	1.31	2.00	9688.00	1.000
Lack of access to a high-speed internet connection	2.31	2.00	1.00	1.34	2.00	7025.00	1.000
Lack of funds for equipment purchases	3.31	4.00	5.00	1.43	3.00	18440.00	0.001*
Lack of funds for software acquisition	3.36	4.00	5.00	1.44	3.00	20711.50	0.000*
Lack of technical support	3.12	3.00	3.00	1.41	2.00	14913.00	0.107
Lack of support from the sport association	2.87	3.00	3.00	1.33	2.00	10458.50	0.955

* Statistically significant at $p < 0.05$

6. Conclusions and Limitations

In the current uncertain and turbulent environment, which is constantly changing under the influence of ICT, managing sport organisations is not easy. In such circumstances, the management of not only professional but also amateur sports cannot be left to chance. Sport managers must integrate ICT into their practices to meet the challenges of technological development. To do this, they need to be ICT literate and have the necessary infrastructure and support. In addition, sport managers at all levels are expected to adopt ICT innovations and encourage others to use new technologies. The process of digital transformation in sport organisations cannot be successful unless managers are actively involved in it. Although technology affects sport managers in many ways, there are a number of important issues related to the introduction and use of ICT in sport management that have not yet been examined. This study sought to address some of these issues and thereby contribute to a better understanding of the process of integrating ICT into sport management.

The results imply that the heads of the Croatian sport organisations recognise the importance and potential of ICT and are willing to adopt it into their practices. It was also found that they believe that ICT is sufficiently used in the management of their organisations. However, it would be premature to conclude that the level of ICT application is satisfactory and that there is no need for improvement. It is possible that this perception stems from managers' unfamiliarity with the technology's capabilities. If this is the case, it is necessary to enhance the ICT literacy of sport managers in both formal and informal educational settings. The study also revealed that the lack of funds is a significant barrier to ICT integration into sport management. It has to be mentioned here that the financing of sport organisations has been a problem for years in Croatia. Available funds are often not enough to meet their needs. The COVID-19 pandemic has further exacerbated this situation and put additional pressure on sport managers. Under such circumstances, purchase of new equipment and software is certainly not a priority.

There are some limitations of the study that need to be addressed. Since the aim of the research was to obtain a comprehensive view of the perceived importance and barriers to ICT integration into sport management, the survey included respondents from different sport settings (private and public organisations, professional and amateur sports clubs, team and individual sports, etc.). For this reason, the questionnaire contained more general questions that are applicable in a wider context. The use of research instruments with specific items for homogeneous target groups would certainly benefit future work in this area. Another concern is related to the sample. It was not possible to determine its representativeness because there was no population data available. Nevertheless, given the diverse background of the participants and the fact that the sample included representatives of almost all national sport federations, it is believed that the results can be generalised to the population of Croatian sport managers. Finally, although the survey was anonymous, there may have been a social desirability bias, and this should be considered when interpreting the findings.

The paper discussed only some of the issues associated with the application of ICT in the management of sport organisations. The conclusions are derived from the analysis of the attitudes and perceptions of sport managers. Their understanding is critical to the successful integration of ICT into management practices. Despite the limitations, the study results may be very useful to scholars, practitioners, and other interested parties. Further research is needed to shed light on other aspects of ICT implementation in the field of sport management.

References

[1]. Hammad, W., & Hallinger, P. (2017). A systematic review of conceptual models and methods used in research on educational leadership and management in Arab societies. *School Leadership & Management*, *37*(5), 434-456. https://doi.org/10.1080/13632434.2017.1366441

[2]. Eden, L., Dai, L., & Li, D. (2010). International Business, International Management, and International Strategy: What's in a Name?. *International Studies of Management & Organization*, *40*(4), 54-68. https://doi.org/10.2753/IMO0020-8825400405

[3]. Ahmed, M. S. (2017). Evolution of knowledge management in business. *Engineering Management Research*, *6*(2), 32-46. https://doi.org/10.5539/emr.v6n2p32

[4]. Haixiang, G., Yijing, L., Shang, J., Mingyun, G., Yuanyue, H., & Bing, G. (2017). Learning from class-imbalanced data: Review of methods and applications. *Expert systems with applications*, *73*, 220-239. https://doi.org/10.1016/j.eswa.2016.12.035

[5]. Simonette M., Magalhães M., & Spina E. (2020). Learning analytics as a sociotechnical system. In K. Arai, R. Bhatia & S. Kapoor (Eds.), *Proceedings of the Future Technologies Conference (FTC) 2019* (Vol. 2, pp. 904-912). Cham: Springer. https://doi.org/10.1007/978-3-030-32523-7_66

[6]. Schmidt, S. L. (2020). How technologies impact sports in the digital age. In *21st Century Sports* (pp. 3-14). Springer, Cham. https://doi.org/10.1007/978-3-030-50801-2_1

[7]. Vîlcu, D. M., Sabau, E., & Niculescu, G. (2015, July). Ict for Sport Professionals. From University Curricula to Sport Training and Back. In *The International Scientific Conference eLearning and Software for Education* (Vol. 3, p. 386). " Carol I" National Defence University.

[8]. Shen, F., Li, J., & Wang, Z. (2012). Information technology and its application in sports science. In *Advances in Future Computer and Control Systems* (pp. 591-596). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-29387-0_91

[9]. Lebed, F. (2017). *Complex sport analytics*. Routledge. https://doi.org/10.4324/9781315692920

[10]. Passfield, L., & Hopker, J. G. (2017). A mine of information: can sports analytics provide wisdom from your data?. *International journal of sports physiology and performance*, *12*(7), 851-855. https://doi.org/10.1123/ijspp.2016-0644

[11]. Link, D., & Lames, M. (2014). An introduction to sport informatics. In *Computer science in sport* (pp. 15-31). Routledge. https://doi.org/10.4324/9781315881782

[12]. Ratten, V. (2019). Introduction: Sport technology and innovation. In *Sports Technology and Innovation* (pp. 1-18). Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-319-75046-0

[13]. Retar, I., Plevnik, M., & Kolar, E. (2013). Key competences of Slovenian sport managers. *Annales kinesiologiae*, *4*(2).

[14]. Soares, J., & Correia, A. (2009). Factors and focuses in the strategic decisions of sporting organisations: empirical evidence in sports associations. *International Journal of Sport Management and Marketing*, *5*(3), 338-354. https://doi.org/10.1504/IJSMM.2009.023242

[15]. Turban, E., Pollard, C., & Wood, G. (2018). *Information technology for management: On-demand strategies for performance, growth and sustainability*. John Wiley & Sons.

[16]. Lucas, H. C. Jr. (2000). *Information technology for management* (7th ed.). Boston, MA: Irwin/McGraw-Hill.

[17]. Reynolds, G. W. (2016). *Information technology for managers* (2nd ed.). Boston, MA: Cengage Learning.

[18]. Devece, C. (2013). The value of business managers''Information Technology'competence. *The Service Industries Journal*, *33*(7-8), 720-733. https://doi.org/10.1080/02642069.2013.740463

[19]. Bassellier, G., Benbasat, I., & Reich, B. H. (2003). The influence of business managers' IT competence on championing IT. *Information systems research*, *14*(4), 317-336. https://doi.org/10.1287/isre.14.4.317.24899

[20]. Setiowati, R., Hartoyo, H., Daryanto, H. K., & Arifin, B. (2015). Understanding ICT adoption determinants among Indonesian SMEs in fashion subsector. *International Research Journal of Business Studies*, *8*(1), 47-57. https://doi.org/10.21632/irjbs.8.1.47-57

[21]. Zhang, P., Zhao, K., & Kumar, R. L. (2016). Impact of IT governance and IT capability on firm performance. *Information Systems Management*, *33*(4), 357-373. https://doi.org/10.1080/10580530.2016.1220218

[22]. Alzamil, Z. A. (2012). Information security awareness at Saudi Arabians' organizations: an information technology employee's perspective. *International Journal of Information Security and Privacy (IJISP)*, *6*(3), 38-55. https://doi.org/10.4018/jisp.2012070102

[23]. Xue, Y., Ghenniwa, H. H., & Shen, W. (2012). Frame-based ontological view for semantic integration. *Journal of Network and Computer Applications*, *35*(1), 121-131. https://doi.org/10.1016/j.jnca.2011.02.010

[24]. Piccoli, G. (2012). *Essentials of Information Systems for Managers: Text Only: Text Only*. Wiley Global Education.

[25]. Abualloush, S., Bataineh, K., & Aladwan, A. S. (2017). Impact of information systems on innovation (product innovation, process innovation)-field study on the housing bank in Jordon. *International Journal of Business Administration*, *8*(1), 95-105. https://doi.org/10.5430/ijba.v8n1p95

[26]. Nair, J., Chellasamy, A., & Singh, B. N. (2019). Readiness factors for information technology adoption in SMEs: testing an exploratory model in an Indian context. *Journal of Asia Business Studies*, *13*(4), 694-718. https://doi.org/10.1108/JABS-09-2018-0254

[27]. Silahtaroğlu, G. (2017). Implementing adaptive strategies of decision support systems during crises. In *Global Business Strategies in Crisis* (pp. 287-302). Springer, Cham. https://doi.org/10.1007/978-3-319-44591-5_20

[28]. Power, D. J. (2008). Understanding data-driven decision support systems. *Information Systems Management*, *25*(2), 149-154. https://doi.org/10.1080/10580530801941124

[29]. Yun, Y., Ma, D., & Yang, M. (2021). Human–computer interaction-based decision support system with applications in data mining. *Future Generation Computer Systems*, *114*, 285-289. https://doi.org/10.1016/j.future.2020.07.048

[30]. Chen, J. Q., & Lee, S. M. (2003). An exploratory cognitive DSS for strategic decision making. *Decision support systems*, *36*(2), 147-160. https://doi.org/10.1016/S0167-9236(02)00139-2

[31]. Woznica, J., & Healy, K. (2009). The level of information systems integration in SMEs in Irish manufacturing sector. *Journal of Small Business and Enterprise Development*, *16*(1), 115-130. https://doi.org/10.1108/14626000910932917

[32]. Boddy, D., Boonstra, A., & Kennedy, G. (2008). *Managing information systems: Strategy and organisation*. Pearson Education.

[33]. Petter, S., Delone, W., & McLean, E. R. (2012). The past, present, and future of" IS success". *Journal of the Association for Information Systems*, *13*(5), 341-362. https://doi.org/10.17705/1jais.00296

[34]. Nurhasan, N., Prahani, B. K., Suprapto, N., Setiawan, B., Deta, U. A., & Al Ardha, M. A. (2022). Sports Research Trends in the Last 10 Years: Information to Librarians, Researchers, and Policy Makers. *TEM Journal*, *11*(1), 289-296. https://doi.org/10.18421/TEM111-36

[35]. Gallardo-Guerrero, L., García-Tascón, M., & Burillo-Naranjo, P. (2008). New sports management software: A needs analysis by a panel of Spanish experts. *International Journal of Information Management*, *28*(4), 235-245. https://doi.org/10.1016/j.ijinfomgt.2007.09.005

[36]. Jinga, G., & Iacobini, A. (2015). Improvement of Managerial Communications in Sports Clubs. *Revista de Management Comparat International*, *16*(4), 514.

[37]. Olaoye, A. K., Ikwuka, F. N., Olubobola, V. F., & Eloji, S. A. (2017). Influence of Information and Communication Technology on Sports Management of Tertiary Institutions of Ilorin Metropolis. *KIU Journal of Social Sciences*, *3*(2), 307-313.

[38]. Šamija, K., Kolar, J., & Jeričević, M. (Eds.). (2019). *National sports program 2019 – 2026: Towards a healthy and active nation proud of its sporting achievements*. Zagreb: Central State Office for Sport. Retrieved from: https://mint.gov.hr/UserDocsImages//dokumenti-sdus/docs/National Sports Program.pdf [accessed: 19 July 2022].